TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP121

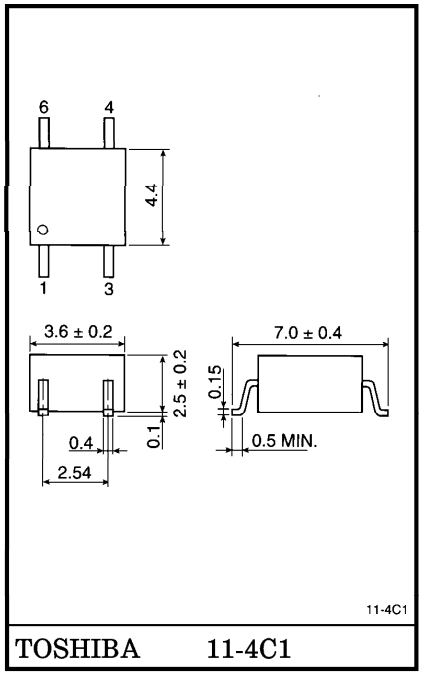
OFFICE MACHINE

PROGRAMMABLE CONTROLLERS

AC / DC-INPUT MODULE

TELECOMMUNICATION

Unit in mm



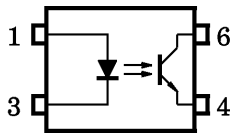
TOSHIBA 11-4C1

Weight : 0.09g

The TOSHIBA MINI FLAT COUPLER TLP121 is a small outline coupler, suitable for surface mount assembly.
TLP121 consists of a photo transistor, optically coupled to a gallium arsenide infrared emitting diode.

- Collector-Emitter Voltage : 80V (Min.)
- Current Transfer Ratio : 50% (Min.)
  Rank GB : 100% (Min.)
- Isolation Voltage : 3750Vrms (Min.)
- UL Recognized : UL 1577, File No. E67349

PIN CONFIGURATIONS (TOP VIEW)



1 : ANODE
3 : CATHODE
4 : EMITTER
6 : COLLECTOR

CURRENT TRANSFER RATIO

TYPE	CLASSIFICATION *1	CURRENT TRANSFER RATIO (%) (I_C / I_F)		MARKING OF CLASSIFICATION
		I_F = 5mA, V_{CE} = 5V, Ta = 25°C		
		MIN.	MAX.	
TLP121	(None)	50	600	BLANK, Y, Y■, G, G■, B, B■, GB
	Rank Y	50	150	Y, Y■
	Rank GR	100	300	G, G■
	—	200	600	B, B■
	Rank GB	100	600	G, G■, B, B■, GB

*1 : Ex, Rank GB : TLP121 (GB)

Note : Application type name for certification test, please use standard product type name, i, e.

TLP121 (GB) : TLP121

MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	RATING	UNIT
LED	Forward Current	I_F	50	mA
	Forward Current Derating	ΔI_F / °C	−0.7 (Ta ≧ 53°C)	mA / °C
	Pulse Forward Current	I_{FP}	1 (100 μs pulse, 100pps)	A
	Reverse Voltage	V_R	5	V
	Junction Temperature	T_j	125	°C
DETECTOR	Collector-Emitter Voltage	V_{CEO}	80	V
	Emitter-Collector Voltage	V_{ECO}	7	V
	Collector Current	I_C	50	mA
	Collector Power Dissipation	P_C	150	mW
	Collector Power Dissipation Derating (Ta ≧ 25°C)	ΔP_C / °C	−1.5	mW / °C
	Junction Temperature	T_j	125	°C
Storage Temperature Range		T_{stg}	−55~125	°C
Operating Temperature Range		T_{opr}	−55~100	°C
Lead Soldering Temperature		T_{sol}	260 (10s)	°C
Total Package Power Dissipation		P_T	200	mW
Total Package Power Dissipation Derating (Ta ≧ 25°C)		ΔP_T / °C	−2.0	mW / °C
Isolation Voltage (Note 1)		BV_S	3750 (AC, 1min., R.H. ≦ 60%)	Vrms

(Note 1) Device considered a two terminal device : Pins 1, 3 shorted together and pins 4, 6 shorted together

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	—	5	48	V
Forward Current	I_F	—	16	20	mA
Collector Current	I_C	—	1	10	mA
Operating Temperature	T_{opr}	−25	—	85	°C

INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V_F	I_F = 10mA	1.0	1.15	1.3	V
	Reverse Current	I_R	V_R = 5V	—	—	10	μA
	Capacitance	C_T	V = 0, f = 1MHz	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 0.5mA	80	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	I_E = 0.1mA	7	—	—	V
	Collector Dark Current	I_{CEO}	V_{CE} = 48V	—	10	100	nA
			V_{CE} = 48V, Ta = 85°C	—	2	50	μA
	Capacitance (Collector to Emitter)	C_{CE}	V = 0, f = 1MHz	—	10	—	pF

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I_C / I_F	I_F = 5mA, V_{CE} = 5V	50	—	600	%
		Rank GB	100	—	600	
Saturated CTR	$I_C / I_{F(sat)}$	I_F = 1mA, V_{CE} = 0.4V	—	60	—	%
		Rank GB	30	—	—	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 2.4mA, I_F = 8mA	—	—	0.4	V
		I_C = 0.2mA, I_F = 1mA	—	0.2	—	
		Rank GB	—	—	0.4	
Off-State Collector Current	$I_{C(off)}$	V_F = 0.7V, V_{CE} = 48V	—	1	10	μA

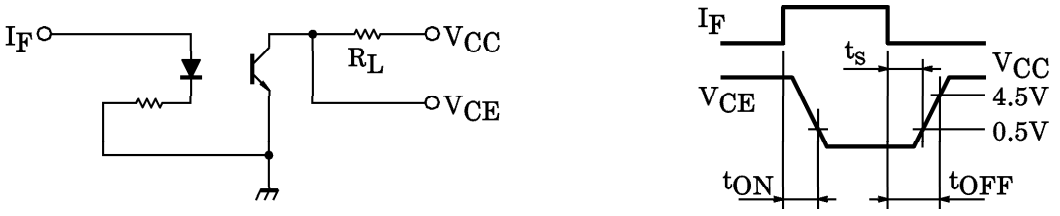
ISOLATION CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance (Input to Output)	C_S	V_S = 0, f = 1MHz	—	0.8	—	pF
Isolation Resistance	R_S	V_S = 500V, R.H. ≦ 60%	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	BV_S	AC, 1 minute	3750	—	—	Vrms
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	Vdc

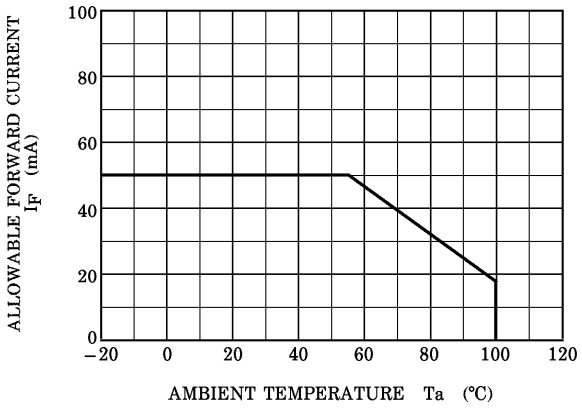
SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	t_r	V_{CC} = 10V, I_C = 2mA R_L = 100Ω	—	2	—	μs
Fall Time	t_f		—	3	—	
Turn-on Time	t_{on}		—	3	—	
Turn-off Time	t_{off}		—	3	—	
Turn-on Time	t_{ON}	R_L = 1.9kΩ (Fig.1) V_{CC} = 5V, I_F = 16mA	—	2	—	μs
Storage Time	t_s		—	25	—	
Turn-off Time	t_{OFF}		—	40	—	

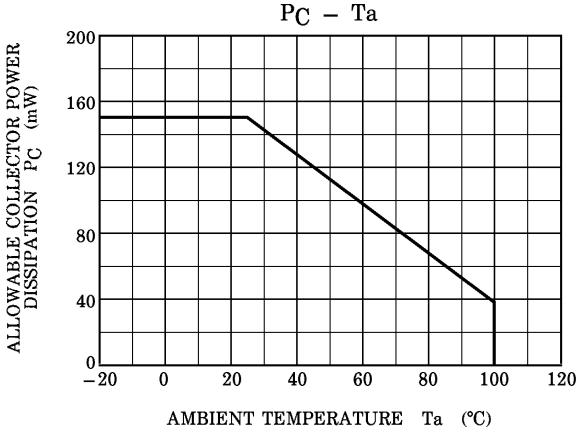
Fig.1 SWITCHING TIME TEST CIRCUIT



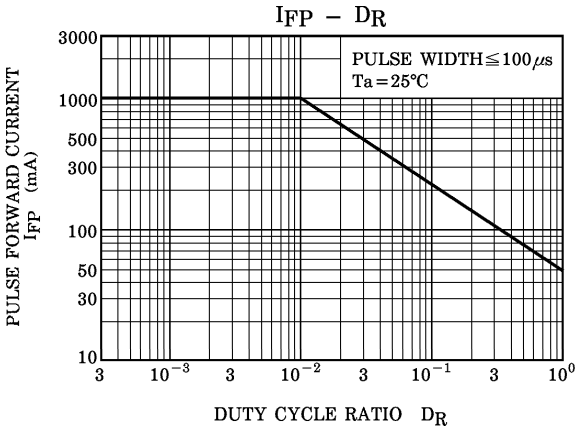
I_F – Ta



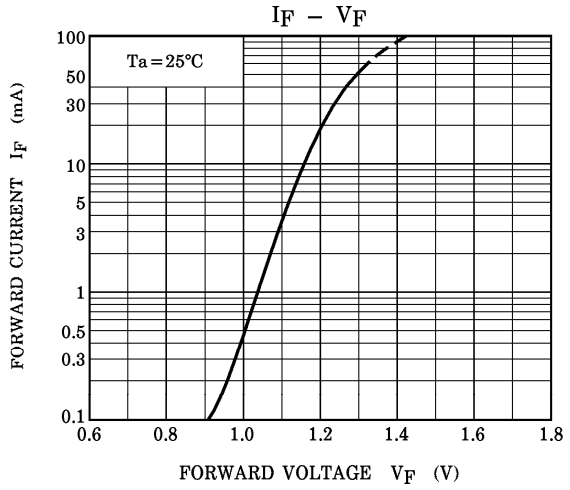
P_C – Ta



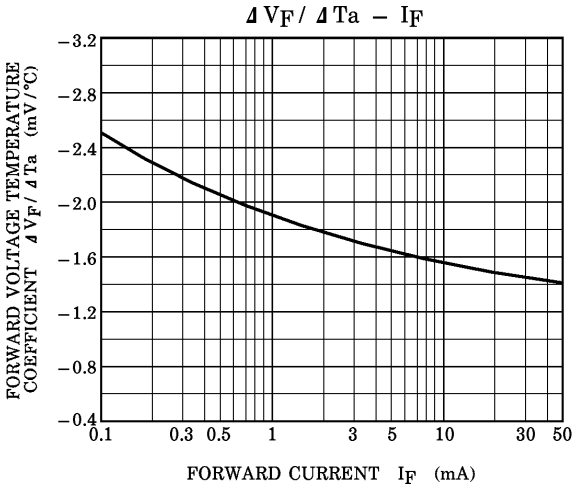
I_{FP} – D_R



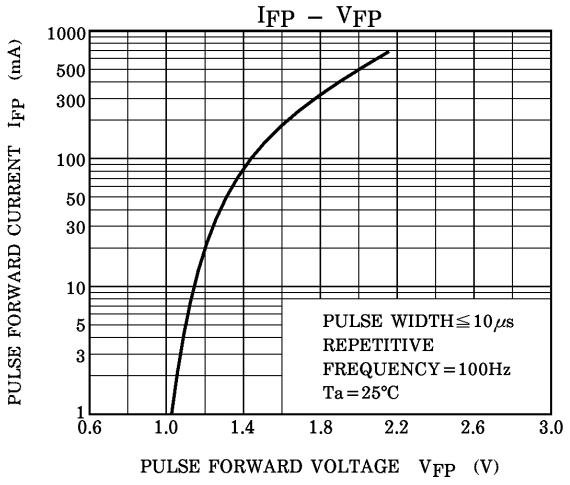
I_F – V_F



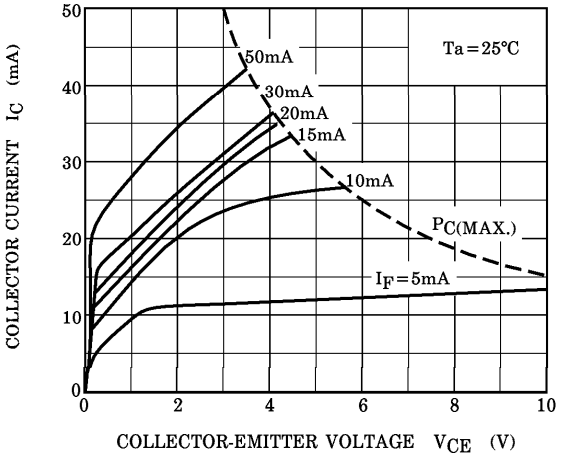
$\Delta V_F / \Delta Ta$ – I_F



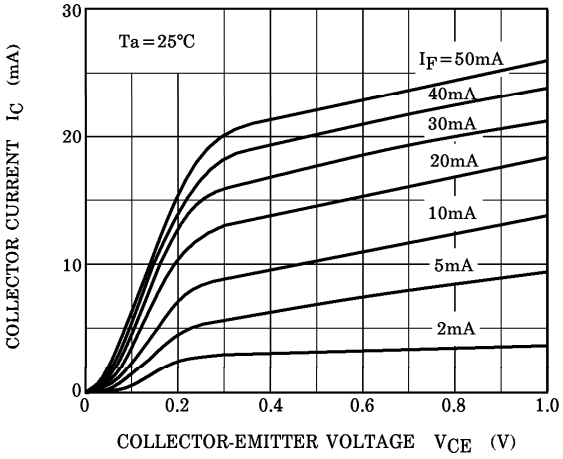
I_{FP} – V_{FP}



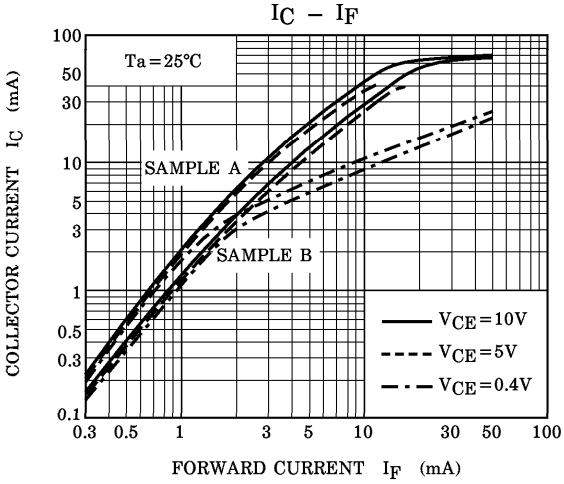
$I_C - V_{CE}$



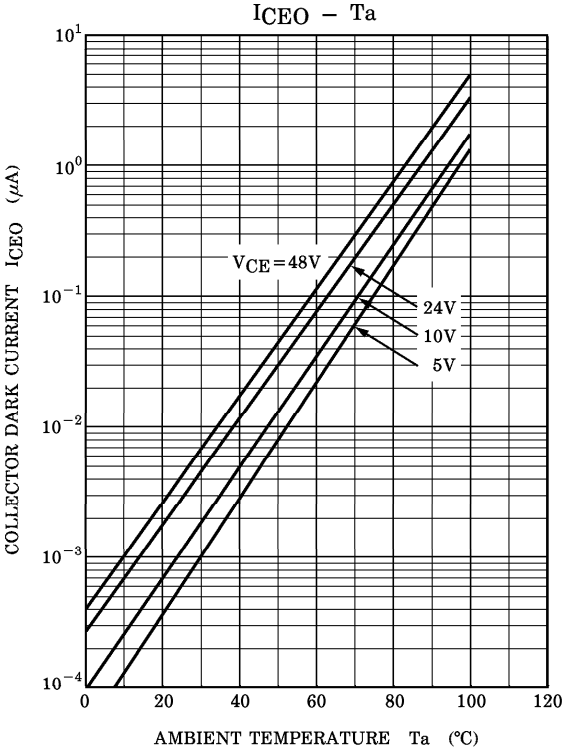
$I_C - V_{CE}$



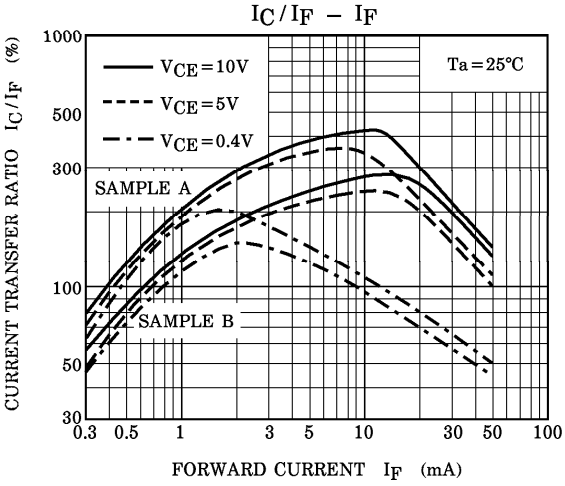
$I_C - I_F$



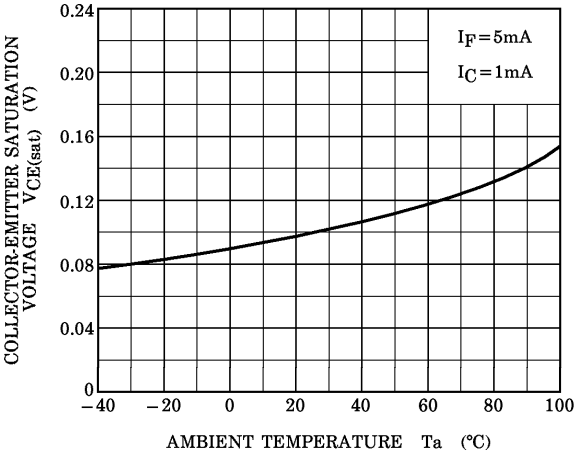
$I_{CEO} - Ta$



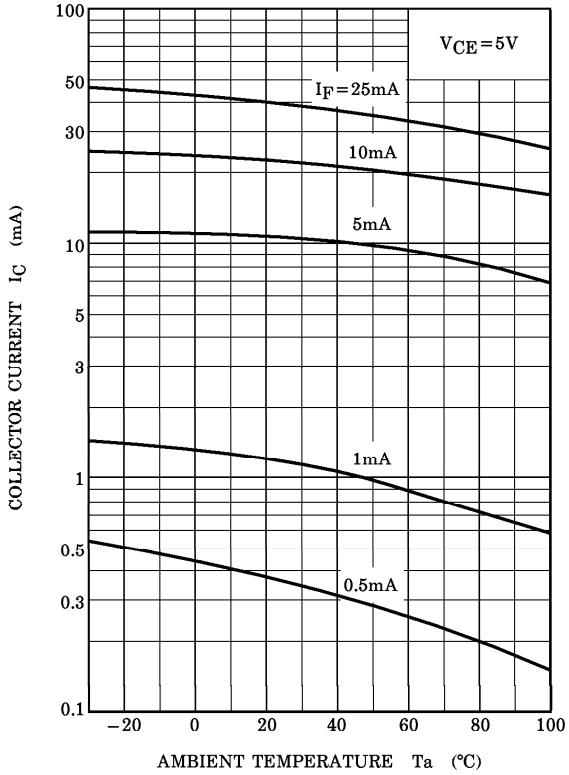
$I_C / I_F - I_F$



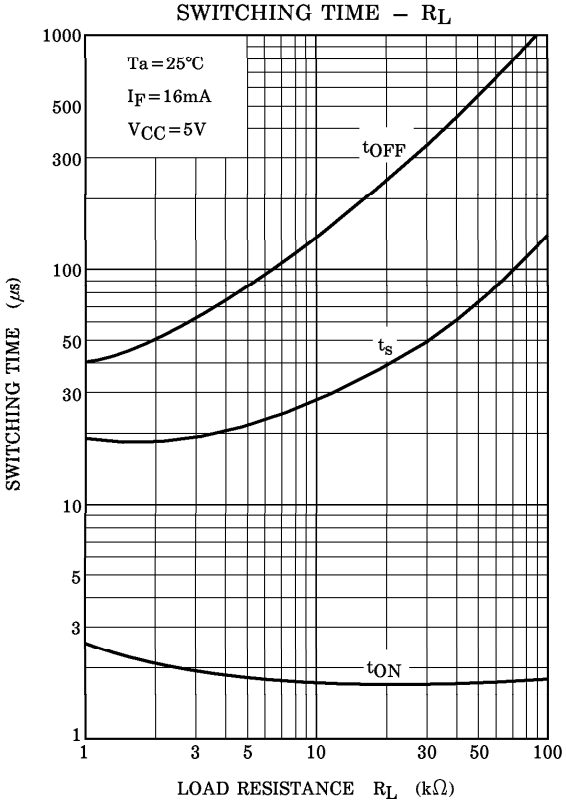
V_{CE} (sat) – Ta



I_C – Ta



SWITCHING TIME – R_L



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